

What is Claimed is:

1. A control circuit for operating a dual directional direct current motor from an alternating current power source, said motor being operatively associated with a first position indication and a second position indication, said control circuit comprising:

a first circuit structured to receive an alternating current voltage from said alternating current power source, said first circuit including a first output, a first direction input and said first position indication, said first output having a first alternating current voltage responsive to said first direction input and said first position indication, said first circuit further including a second output, a second direction input and said second position indication, said second output having a second alternating current voltage responsive to said second direction input and said second position indication;

means for rectifying one of the first and second alternating current voltages from said first circuit and providing an output having a direct current voltage responsive to the first alternating current voltage and the second alternating current voltage; and

a second circuit having an input energized responsive to at least one of the first and second outputs of said first circuit, said second circuit further having a first output when the input thereof is not energized and having a second output when the input thereof is energized, the first output of said second circuit enabling said means for rectifying to apply the direct current voltage to said motor at one of a first polarity and a second polarity, at least one of the first and second outputs of said second circuit providing a braking action to said motor responsive to removal of one of the first and second alternating current voltages of said first circuit.

2. The control circuit of Claim 1 wherein said first circuit includes a controller and a third circuit, said controller including a first position indication input adapted to receive said first position indication, a second position indication input adapted to receive said second position indication, said first direction output and said second direction output, said third circuit being structured for cooperation with said alternating current power source and said controller, said third circuit receiving said first direction output and said second direction output and including said first

output having the first alternating current voltage responsive to said first direction input and said first position indication and said second output having the second alternating current voltage responsive to said second direction input and said second position indication, said third circuit further including a first set of outputs responsive to said first direction output and a second set of outputs responsive to said second direction output; wherein said means for rectifying is a rectifier receiving one of the first and second alternating current voltages from said third circuit and a ground or neutral of said alternating current power source and providing the output having the direct current voltage responsive to one of the first alternating current voltage and the second alternating current voltage; and wherein said second circuit is responsive to the direct current voltage of the output of said rectifier, said second circuit providing the first output when the input thereof is energized and providing the second output when the input thereof is not energized, said first output of said second circuit enabling the first set of outputs of said third circuit to provide the direct current voltage of the output of said rectifier to said motor at the first polarity, said first output of said second circuit enabling the second set of outputs of said third circuit to provide the direct current voltage of the output of said rectifier to said motor at the second polarity, said second output of said second circuit providing a braking action to said motor responsive to removal of the direct current voltage from the output of said rectifier following removal of said one of the first alternating current voltage and the second alternating current voltage.

3. The control circuit of Claim 1 wherein said first circuit includes a third circuit and a fourth circuit, said third circuit structured to receive the alternating current voltage from said alternating current power source, said third circuit including said first output of said first circuit, said first direction input and said first position indication, said first output of said third circuit having said first alternating current voltage responsive to said first direction input and said first position indication, said fourth circuit structured to receive the alternating current voltage from said alternating current power source, said fourth circuit including said second output of said first circuit, said second direction input and said second position indication, said second output of said fourth circuit having said second alternating current voltage responsive to said second direction input and said second position

indication; wherein said means for rectifying includes a first rectifier and a second rectifier, said first rectifier receiving the first output of said third circuit and a ground or neutral of said alternating current power source, said first rectifier providing an output having a first direct current voltage with a first polarity responsive to the first alternating current voltage of the first output of said third circuit, said second rectifier receiving the second output of said fourth circuit and the common or the neutral of said alternating current power source, said second rectifier providing an output having a second direct current voltage with a second polarity responsive to the second alternating current voltage of the second output of said fourth circuit; and wherein said second circuit has the input thereof energized by the second alternating current voltage of the second output of said fourth circuit, said second circuit having a first output when the input thereof is not energized and having a second output when the input thereof is energized, the first output of said second circuit enabling said first rectifier to apply the direct current voltage of the output of said first rectifier to said motor, the second output of said second circuit enabling said second rectifier to apply the direct current voltage of the output of said second rectifier to said motor, the first output of said second circuit providing the braking action to said motor responsive to removal of the second alternating current voltage of said second circuit.

4. The control circuit of Claim 1 wherein said alternating current power source is a redundant alternating current power source; and wherein said first circuit is structured for cooperation with said redundant alternating current power source.

5. A control circuit for operating a dual directional direct current motor from an alternating current power source, said motor being operatively associated with a first position indication and a second position indication, said control circuit comprising:

a controller including a first position indication input adapted to receive said first position indication, a second position indication input adapted to receive said second position indication, a first direction output and a second direction output;

a first circuit structured for cooperation with said alternating current power source and said controller, said first circuit receiving said first direction

output and said second direction output and including an output having an alternating current voltage responsive to one of said first direction output and said second direction output, said first circuit further including a first set of outputs responsive to said first direction output and a second set of outputs responsive to said second direction output;

a rectifier receiving the alternating current voltage of the output of said first circuit and providing an output having a direct current voltage responsive to said alternating current voltage; and

a second circuit responsive to the direct current voltage of the output of said rectifier, said second circuit providing a first output and a second output, said first output of said second circuit enabling the first set of outputs of said first circuit to provide the direct current voltage of the output of said rectifier to said motor at a first polarity, said first output of said second circuit alternatively enabling the second set of outputs of said first circuit to provide the direct current voltage of the output of said rectifier to said motor at a second polarity, said second output of said second circuit providing a braking action to said motor responsive to removal of the direct current voltage from the output of said rectifier following removal of the alternating current voltage from the output of said first circuit.

6. The control circuit of Claim 5 wherein said motor is further operatively associated with a dual directional transfer mechanism.

7. The control circuit of Claim 5 wherein said alternating current power source is a redundant alternating current power source; and wherein said first circuit is structured for cooperation with said redundant alternating current power source.

8. The control circuit of Claim 5 wherein said controller includes a first contact output providing said first direction output and a second contact output providing said second direction output.

9. The control circuit of Claim 8 wherein said first contact output and said second contact output are electrically connected in series with a common terminal, which is adapted to receive an alternating current voltage from said alternating current power source.

10. The control circuit of Claim 5 wherein said first circuit includes a first relay having three contacts operated by a first coil and a second relay having three contacts operated by a second coil said first coil being energized by said first direction output, said second coil being energized by said second direction output, one of the contacts of said first relay providing the output having the alternating current voltage responsive to said one of said first direction output and said second direction output, one of the contacts of said second relay providing the output having the alternating current voltage responsive to the other one of said first direction output and said second direction output, the pair of the contacts of said first relay providing the direct current voltage of the output of said rectifier to said motor at the first polarity, the pair of the contacts of said second relay providing the direct current voltage of the output of said rectifier to said motor at the second polarity.

11. The control circuit of Claim 5 wherein said rectifier is a full-wave diode bridge including a first terminal receiving the output of said first circuit, a second terminal adapted to receive a ground or neutral from said alternating current power source, and third and fourth terminals providing the output having the direct current voltage responsive to the alternating current voltage of the output of said first circuit.

12. The control circuit of Claim 5 wherein said second circuit is a relay having a coil, a first contact and a second contact, the coil of the relay of said second circuit being responsive to the direct current voltage of the output of said rectifier, the first contact of the relay of said second circuit being the first output of said second circuit enabling the first set of outputs of said first circuit to provide the direct current voltage of the output of said rectifier to said motor at the first polarity or enabling the second set of outputs of said first circuit to provide the direct current voltage of the output of said rectifier to said motor at the second polarity, the second contact of the relay of said second circuit being the second output of said second circuit providing the braking action to said motor.

13. The control circuit of Claim 12 wherein said second contact of the relay of said second circuit is adapted to be electrically connected in parallel with said motor.

14. A control circuit for operating a dual directional direct current motor from an alternating current power source, said motor being operatively associated with a first position indication and a second position indication, said control circuit comprising:

a first circuit structured to receive an alternating current voltage from said alternating current power source, said first circuit including a first output, a first direction input and said first position indication, said first output having a first alternating current voltage responsive to said first direction input and said first position indication;

a second circuit structured to receive the alternating current voltage from said alternating current power source, said second circuit including a second output, a second direction input and said second position indication, said second output having a second alternating current voltage responsive to said second direction input and said second position indication;

a first rectifier receiving the first output of said first circuit and a ground or neutral of said alternating current power source, said first rectifier providing an output having a direct current voltage with a first polarity responsive to the first alternating current voltage of the first output of said first circuit;

a second rectifier receiving the second output of said second circuit and the common or the neutral of said alternating current power source, said second rectifier providing an output having a direct current voltage with a second polarity responsive to the second alternating current voltage of the second output of said second circuit; and

a third circuit having an input energized by the second alternating current voltage of the second output of said second circuit, said third circuit having a first output when the input thereof is not energized and having a second output when the input thereof is energized, the first output of said third circuit enabling said first rectifier to apply the direct current voltage with the first polarity of the output of said first rectifier to said motor, the second output of said third circuit enabling said second rectifier to apply the direct current voltage with the second polarity of the output of said second rectifier to said motor, the first output of said

third circuit and said first rectifier providing a braking action to said motor responsive to removal of the second alternating current voltage of said second circuit.

15. The control circuit of Claim 14 wherein said first circuit includes a first contact electrically connected in series with a second contact, said first contact being said first direction input and said second contact being said first position indication, one end of the series combination of said first and second contacts being adapted to receive the alternating current voltage from said alternating current power source, the other end of the series combination of said first and second contacts providing the first output of said first circuit.

16. The control circuit of Claim 14 wherein said second circuit includes a first contact electrically connected in series with a second contact, said first contact being said second direction input and said second contact being said second position indication, one end of the series combination of said first and second contacts being adapted to receive the alternating current voltage from said alternating current power source, the other end of the series combination of said first and second contacts providing the second output of said second circuit.

17. The control circuit of Claim 14 wherein said first rectifier is a full-wave diode bridge including a first terminal receiving the first output of said first circuit, a second terminal adapted to receive the ground or neutral from said alternating current power source, and third and fourth terminals providing the first output having the direct current voltage.

18. The control circuit of Claim 14 wherein said second rectifier is a full-wave diode bridge including a first terminal receiving the second output of said second circuit, a second terminal adapted to receive the ground or neutral from said alternating current power source, and third and fourth terminals providing the second output having the direct current voltage.

19. The control circuit of Claim 14 wherein said third circuit is a relay having a coil energized by the alternating current voltage of the second output of said second circuit, a first contact which is closed when the coil thereof is not energized and having a second contact which is closed when the coil thereof is energized, the first contact of said third circuit enabling said first rectifier to apply the direct current voltage of the output of said first rectifier to said motor, the second

contact of said third circuit enabling said second rectifier to apply the direct current voltage of the output of said second rectifier to said motor.

20. The control circuit of Claim 19 wherein when said coil is not energized and said first contact is closed, said first rectifier is adapted to providing braking to said motor.

21. The control circuit of Claim 20 wherein said first rectifier includes a pair of diodes, which are electrically connected in series with said first contact, with the series combination of said pair of diodes and said first contact being adapted to be electrically connected in parallel with said motor.